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ABSTRACT

This study investigated the capital renewal and deferred maintenance needs of colleges and universities in the United States. An introductory chapter gives an overview of campus change and facilities planning since 1950, including the rapid and extensive growth of college and university facilities and the convergence of various factors that have placed stress on institutional operating budgets. This chapter also outlines the methodology of the study survey of almost 700 diverse institutions. The second chapter summarizes findings concerning facility conditions: Since 1950 college and university facility space has more than quintupled, and institutions would have to invest about $300 billion today to construct the same space; current capital renewal and replacement needs are estimated at $60 billion, with priority repairs and renovations requiring about $20.5 billion; in 1988 colleges and universities deferred four dollars of maintenance for every dollar spent, with classroom, laboratory, and library space cited most frequently as priorities; most institutions rely primarily on tax-exempt bonds and state funding to finance capital needs. The third chapter draws conclusions and implications, and the fourth presents profiles of needs, plans, and funding by institution type. Chapter 5 contains technical notes. A list of suggested readings is offered in chapter 6. A glossary of terms is included in chapter 7. (Contains 100 references.) (MSE)

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A Joint Report of
Association of Physical Plant Administrators of Universities and Colleges
and National Association of College and University Business Officers
in cooperation with Coopers & Lybrand

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The Decaying American Campus

A Ticking Time Bomb

Prepared by:

Sean C. Rush and
Sandra L. Johnson
of Coopers & Lybrand

Foreword by:

Dr. Harvey H. Kaiser
Senior Vice President, Syracuse University

A joint report of the Association of Physical Plant Administrators of Universities and Colleges and the National Association of College and University Business Officers in cooperation with Coopers & Lybrand

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Senior Vice President, Syracuse University

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Foreword

by Dr. Harvey H. Kaiser

Senior Vice President,
Syracuse University

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Foreword

The Decaying American Campus: A Ticking Time Bomb is more than an alarmist title to catch a reader's attention. This important study makes a major contribution to the higher education community by calling attention to the capital renewal and replacement needs of this country's campuses. The authors – the Association of Physical Plant Administrators of Universities and Colleges, the National Association of College and University Business Officers, and Coopers & Lybrand – are to be lauded for filling a much needed gap in information for campus administrators, governing board members, and federal and state legislators.

The often asked question about facilities capital needs is: "Where do we stand?" Until this survey, the last comprehensive study of facilities was published by the Center for Educational Statistics based on 1974 data. The desire to find a relative position among other campuses is answered by the useful data reported in this study. A long standing need has been capably satisfied. By asking a limited number of critical questions, the study now provides institutions with a useful tool for comparative purposes. The organization and format add to the ease of evaluating the presentation.

Salient features of the study are the overview of age of campus facilities, total amount of space, and 1988 replacement values of facilities. It is a surprising fact that previous estimates of the total replacement value of higher education's physical plant was understated for what was considered a period of limited plant additions. The significance of this discovery by the study is limited to the proportions of the reported $300 billion in replacement value to

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plant in need of capital renewal and replacement. The estimate of 20 percent of plant requiring renewal and replacement results in a projection nationally of $60 billion in needs. This is further qualified in the study of $20 billion nationally in "urgent needs."

Going beyond a national level of information, the study's methodology of organizing data by Carnegie classifications provides comparisons for different levels of institutions. Profiles of "average" institutions are an invaluable reference, especially data on cost per square foot of urgent needs. This information is at the heart of gauging potential campus needs. Wisely, the authors attempted to separate repairs and renovations from requests for functional improvements. By defining urgent need as "repairs and renovations which place facilities at risk if left undone," the survey approximates campus deferred maintenance costs.

Those institutions that have conducted facilities audits may find comfort that the intimidating amounts of renewal and replacement found on their campuses exists elsewhere. For those institutions that have not conducted audits of their plant condition, there is compelling evidence for them to uncover their own ticking time bomb.

Acknowledgments

The Association of Physical Plant Administrators of Universities and Colleges and the National Association of College and University Business Officers gratefully acknowledge the contribution of a team of member volunteers, staff, and business associates who made possible this most important research on the condition of the nation's higher education facilities.

We wish to recognize the chairmen and volunteer committees who defined the parameters of our joint research: Herbert Peterson, University of Richmond, 1987-88 Chair, and his NACUBO Facilities Planning and Management Committee; APPA's 1987/88 Special Projects Committee, chaired by Joe Estill, Texas A&M University; and APPA's Research and Survey Subcommittee, chaired by Russell Reister, University of Michigan.

We are deeply indebted to the consulting and accounting firm of Coopers & Lybrand which contributed many hundreds of hours in the methodology preparation, data entry, and analysis of this project. Sean Rush, Director of Higher Education Consulting Services and Sandra Johnson at Coopers & Lybrand were indispensable to the project's development and outcomes. It is most appropriate that they presented the analysis of findings within this report.

We also acknowledge our project grantor: the Nalco Chemical Company and its Chairman of the Board, Mr. W. H. Clark Jr. for their generosity and com-

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mitment to a vision of facilities needs in higher education which made this project possible.

It is appropriate, too, to recognize APPA and NACUBO staff members who accepted repeated assignments, in addition to regular duties, to bring the project to completion. They include Wayne Leroy and Steve Glazner at APPA; and Mary Jane Calais, Jack Cox, and David Byer at NACUBO.

Special thanks should be given to the many institutions that responded to our request for data. Without their cooperation, this project would not have been possible.

We also appreciate the advice, encouragement, and continued support from our colleagues in the Washington Higher Education Secretariat. Advice and consultation were also given by the National Center for Education Statistics and the National Science Foundation.

We would like to thank some individuals for their invaluable assistance with this project: Michael Callnan of Boston College for his guidance and input on the development of our survey instrument; Harvey Kaiser of Syracuse University for his comments and suggestions at key points in this study; the MCS word processing group at Coopers & Lybrand for their time and effort in preparing this document; and in particular, thanks to Nancy M. Dayer at Coopers & Lybrand for her editorial work and Kelly Welby, Lillian Flores and William Bauer for their typesetting and graphics efforts.

The following Coopers & Lybrand staff should also be recognized for their contributions to this project: Gwenn Branche, Maura Dunn, Jeff Ell, Leslie Good, Tom Griffin, Julie Hart, Karen Jones, Chris Marx, Catherine Morse, Diane Savoca, Mike Schramm, Jeff Siegel.

Finally, we recognize this project as a further demonstration that as associations, member volunteers, staffs, business associates and grantors, we can accomplish together what we could never attempt on our own. It is our hope that we have contributed, by this survey of facility conditions, to the preservation and enhancement of educational opportunity in America.

Caspa L. Harris Jr.
Executive Vice President
National Association of College & University Business Officers

Walter A. Schaw
Executive Vice President
Association of Physical Plant Administrators of Universities & Colleges

Part One

Chapter One – Background and Introduction
Chapter Two – Overview of Survey Findings
Chapter Three – Conclusions

Chapter One

Background and Introduction:

College and University Facilities Since 1950

College and University Facilities at Risk

America's college and university facilities are decaying. The "time bomb," as many have called it, continues to tick. At risk is the ability of colleges and universities to fulfill their missions of teaching and research in an increasingly knowledge-based society. The issue is much broader than endangerment of life and safety. Aging and deteriorating facilities pose a threat to the first-class learning and the advanced research required by America in the coming decades. Like much of of this country's infrastructure of highways, bridges, and transportation facilities, higher education has suffered from chronic under-investment in capital renewal and replacement. Some experts believe that the "bomb" may have already detonated.

(1) The "Golden Age" of Higher Education

The roots of today's problem can be traced to the late 1940s, when returning World War II veterans flooded colleges and universities to begin or continue educations interrupted by the war. Drawing on educational benefits provided by the Serviceman's Readjustment Act of 1944 (better known as the G.I. Bill), veterans created an enormous demand for higher education services. In response, colleges and universities expanded academic programs and constructed new facilities, thus beginning the largest expansion of higher education in the history of the nation.

In the late 1950s, the Soviet Union launched not only a satellite call Sputnik but a space race which dramatically expanded sponsored research activities at

colleges and universities. Research in areas such as public health, defense, computing, and medicine spurred even further facility growth.

Coupled with the rapid infusion of veterans into higher education and enormous research growth, was one of the largest baby booms in the history of the nation. In 1946, there were approximately 2.6 million births in the United States. By 1957, the number of births approximated 4.3 million. As "baby boomers" moved through the educational system in the 1960s and 1970s, they, placed additional demands on colleges and universities for expanded facilities.

This so-called "golden age" of higher education can be illustrated by several pertinent facts:

- Total enrollment in American colleges and universities grew more than 400% from 2.7 million in the early 1950s to the current 12 million.
- The total number of institutions grew by more than 80% from 1,800 in 1950 to 3,300 today
- New institutions (primarily public two-year institutions) opened at a rate of one every two weeks between 1955 and 1974
- The total number of faculty increased from 265,000 in the mid-1950s to an estimated high of 890,000 in the early 1980s, a jump of 235%
- Between 1955 and 1988, the number of degrees earned each year grew by 268%, from 380,000 to 1.4 million
- In 1955 the National Science Foundation (NSF) spent approximately $300 million on campus research and development. By 1974, that spending had increased ten-fold % to $3 billion.

(2) Facility Space Tripled

The impact of this unprecedented growth on college and university facilities was predictable. Between 1950 and 1975, higher education's physical space tripled in size. More college and university space was constructed during this 25-year period than in the prior 200 years. By the early 1970s, the Federal government, state governments, and private donors had made an enormous investment in educational facilities which, at the time, were relatively new and responsive to educational needs.

By the late 1970s and early 1980s, the situation had changed:

- The baby boom of the 1950s and 1960s had declined, resulting in fewer traditional age students.

- Inflation and soaring energy costs during the 1970s and early 1980s squeezed college and university operating budgets.

- Although many new facilities had been built during the 1960s, their construction was at the expense of older buildings which were deteriorating and accumulating backlogs of undone maintenance.

- In addition, many of the buildings constructed during the 1960s were not of optimal quality in terms of longevity. In the rush to meet surging student demand and to stretch available capital, institutions cut back on building material quality. The facilities were functional in the near term, but not likely to hold up over time.

The convergence of these various factors placed enormous stress on college and university operating budgets. In the competition for funds between personnel salaries, academic programs, and facility reinvestment, the facilities lost. As funds were allocated for more pressing institutional needs, college and university facilities began to accumulate growing backlogs of deferred maintenance and postponed capital renewal and replacement. That trend continues today.

(3) Recognizing the Problem

The facility decay issue is not new. The problem has been cited by numerous authors and associations during the past 10 years. A scan of various book and article titles suggests the seriousness of the problem: "Crumbling Academe," "Mortgaging the Future...," "Before the Roof Caves In...," and "Building Deterioration...(a) Hidden Crisis." Missing from these discussions, however, is comprehensive national data about the size of the capital renewal and replacement dilemma. The last national study of facility conditions was conducted in 1974. Since then, individual institutions, state coordinating boards, and other organizations have conducted facility studies, but on an institution- or state-specific basis. Much of the current information is anecdotal and, while documenting part of the problem, lacks utility as a basis for the calculation of capital renewal and replacement needs nationally.

(4) Purpose of the Study – Quantifying the Capital Need

This study is an attempt to fill some of the void with capital renewal/replacement data. Its objectives were threefold:

- To quantify, in dollars, the magnitude of the deferred maintenance and capital renewal/replacement problem in American higher education
- To obtain a better sense of the overall condition of higher education's physical plant
- To identify the gap between current and needed funding levels.

In addition, the study attempted to estimate the total amount of facility space at colleges and universities as well as its replacement value.

Our sample of almost 700 institutions was drawn from the data base of the Carnegie Foundation for the Advancement of Teaching using their institutional typology. Using the Carnegie typology, institutional data was collected, aggregated, and analyzed during the spring and summer of 1988 as a basis for presentation in this report.

Virtually all of the data in this report is arrayed against the Carnegie typology. The Carnegie classifications are as follows:

- *Research Universities:* These institutions offer a full range of baccalaureate programs, are committed to graduate education through the doctorate degree, and give high priority to research.

- *Doctorate-Granting Universities:* In addition to offering a full range of baccalaureate programs, the mission of these institutions includes a commitment to graduate education through the doctorate degree.

- *Comprehensive Universities and Colleges:* These institutions award more than half of their baccalaureate degrees in two or more occupational or professional disciplines, such as engineering or business administration, and may also offer graduate education through the masters degree.

- *Liberal Arts Colleges:* These institutions are primarily undergraduate colleges that award more than half of their baccalaureate degrees in arts and science fields.

- *Two-Year Community, Junior, and Technical Colleges:* These institutions offer certificate or degree programs through the Associate of Arts level and, with few exceptions, offer no baccalaureate degrees.

- *Medical Schools and Medical Centers:* These institutions award most of their professional degrees in medicine.

The data was *not* analyzed by state or by region. In addition, it does not differentiate between public and private institutions.

This report is divided into several sections.

- Chapter 2 provides an overview of the survey findings.

- Chapter 3 outlines some conclusions and suggests additional work to be done on the topic of capital renewal and replacement.

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- Part II of this book provides survey results by institutional type, cites further reading for those interested in the topic, and gives definitions of key terms.

While not conclusive, this study is a contribution to the growing needs for information about the condition of college and university facilities. These facilities represent a physical, tangible endowment provided to each institution by donors and taxpayers. Their continuing aesthetic and functional value to colleges and universities can only be preserved through ongoing investment.

Chapter Two

Overview of Survey Findings:

Facility Conditions at
American Colleges and Universities

Summary of Key Survey Findings

- Since 1950, college and university **facility space has more than quintupled** and now represents some 3 billion gross square feet of classrooms, laboratories, libraries, offices, dormitories, and other space.

- American institutions of higher learning would have to invest approximately **$300 billion to reconstruct their facilities today**.

- The capital **renewal and replacement needs** of U.S. colleges and universities are currently **estimated at $60 billion**.

- Priority repairs and renovations or "**urgent needs**" **require an estimated $20.5 billion** of the total $60 billion.

- **Facility reinvestment has not kept pace** with the growing need. Colleges and universities deferred $4.00 of needed maintenance for every $1.00 spent in 1988.

- **Classroom, laboratory, and library space** were the three most frequently cited **priorities** for construction and renovation.

- Most institutions rely primarily on **tax-exempt bonds and state funding** to finance their capital needs.

1. America's college and university campuses are aging and deteriorating.

"We find ourselves...with aging facilities, buildings that are literally falling down around our ears." (1)

(1) Functional, up-to-date facilities are an essential condition for effective teaching, quality research and responsive public service.

- Although faculty and students represent the core of any educational enterprise, the facilities in which learning and research take place are vital to the effectiveness of those activities. Record levels of full- and part-time students (some 12 million nationally) now utilize higher education facilities throughout the United States. Likewise, essential research in medicine, defense, public health, and other branches of science is conducted at numerous institutions on behalf of government, business and industry.

- At a minimum, facilities must be safe and functional. Ideally, they provide the environment and house the equipment to support first-rate learning and state-of-the-art research. Yet, many institutions fail to meet these standards. Often, faculty members teach or conduct research in inadequate facilities using old or obsolete equipment. Without an appropriate physical infrastructure, teaching and research suffer.

(1) D. Allan Bromley, Vice Chairman of the White House Science Council Panel on the Health of U.S. Universities and Colleges in 1986 from "The State of College and University Facilities, A Survey of College and University Planners," conducted by David P. Helpern and the Society for College and University Planning, July 1987.

- For a society that will become increasingly dependent on an educated population and workforce, any diminution in the quality of teaching and research is onerous.

"As society becomes more complex, the amount of education and knowledge needed to make a productive contribution to the economy becomes greater. A century ago, a high school education was thought to be superfluous for factory workers and a college degree was the mark of an academic or a lawyer. Between now and the year 2000, for the first time in history, a majority of all new jobs will require postsecondary education. Many professions will require nearly a decade of study following high school, and even the least skilled jobs will require a command of reading, computing, and thinking that was once necessary only for the professions."(2)

- Critical components of meeting society's need for a skilled, educated population are modern facilities and functional, up-to-date equipment.

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(2) One-third of higher education's physical plant is now 30 or more years old; almost two-thirds is 20 or more years of age.

- The previous chapter cited the enormous demand placed on higher education facilities during the 1950s, 1960s, and 1970s. With that demand, came substantial growth in the amount of physical plant space. As the chart on the following page indicates, the decade of the 1960s saw the most growth in total higher education plant. Nearly two-thirds of all college and university space was constructed prior to 1970 and is now twenty years old.

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(2)"Workforce 2000, Work and Workers for the Twenty-first century," by William B. Johnston and Arnold H. Packer, Hudson Institute, Indianapolis, Indiana, June 1987.

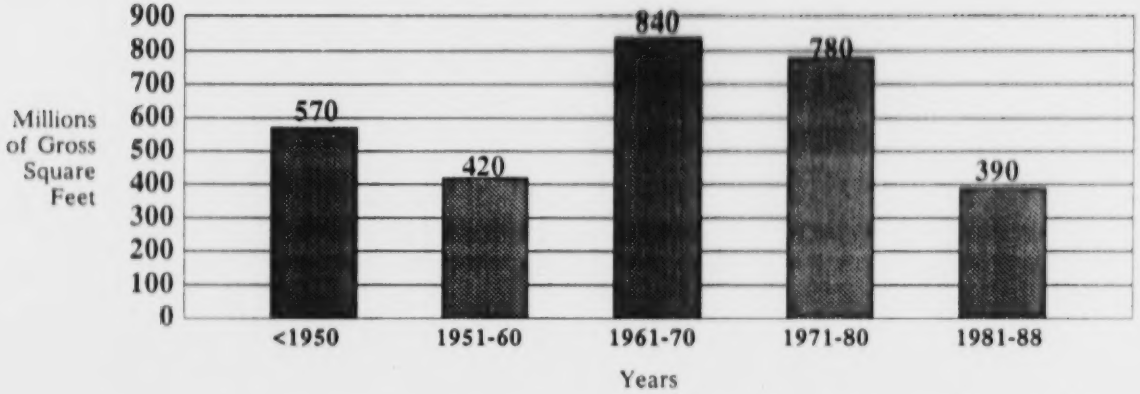

Figure 1

Growth of Space by Decade

- Age alone is not a critical problem. As long as adequate, ongoing investment in existing facilities is made, many buildings can continue to function effectively. Therein lies the problem.

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(3) As early as 1974, a national survey indicated that 20% of all college and university space was in need of renewal, replacement, or demolition.

- A 1974 inventory of physical facilities in colleges and universities by the National Center for Education Statistics (NCES) suggested that approximately 20% of the then 2 billion gross square feet of space required remodeling, renovation, demolition, or termination. The survey included some 3,000 institutional units and reported data from Fall 1974.

- The 20% figure implied that some 400 million gross square feet of space needed improvement of some type in 1974. What further deterioration in facility space has occurred during the intervening 15 years is not readily known.

- No other national studies of total space, its replacement value, and its renewal and replacement needs have been conducted since 1974.

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(4) Based on the results of this survey, there is no reason to believe the facility conditions have improved since 1974.

- As the following pages will outline, this survey did not uncover any evidence that overall facility conditions have improved since 1974. By many estimates of college and university facility managers, they have worsened.

2. American college and university facilities now represent at least 3 billion gross square feet of classrooms, laboratories, libraries, dormitories, and other space.

"...plant expansion has produced a major future and probably accelerating escalation for plant maintenance, repairs, and replacement...we find scant evidence...that this expense problem is being anticipated".(3)

(1) Higher education facilities have grown more than five-fold since 1950.

- As early as 1970, Hans Jenny and Richard Wynn expressed concern about inadequate planning for facility maintenance, repair, and replacement. Their comments came in the wake of the largest 10-year growth in facilities in the history of higher education. Since then, plant space has grown by one-third.

- The results of this survey indicate that college and university facility space has more than quintupled since 1950, growing from 570 million gross square feet (gsf) to 3 billion gsf today.

- Viewed another way, total current college and university facility space is approximately 170 times greater than the downtown office space of the cities of Minneapolis and St. Paul combined.

(3)Jenny Hans and Wynn, G. Richard, *The Golden Years*, Wooster, Ohio: The College of Wooster, 1970.

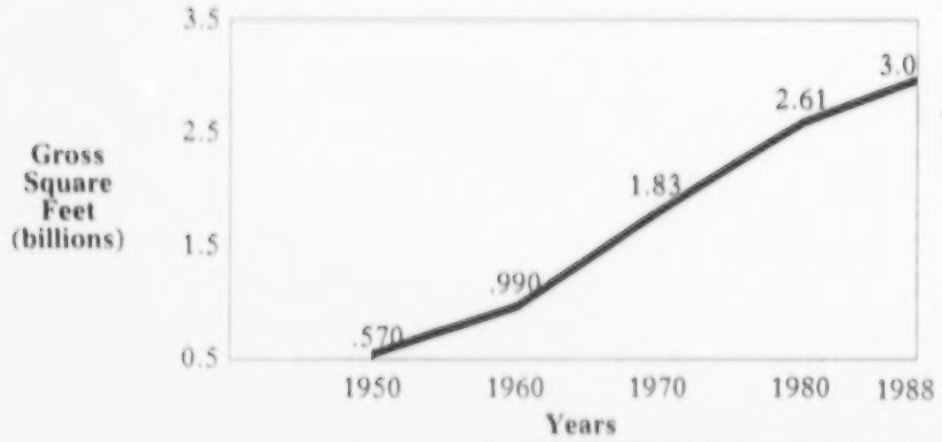

Figure 2

Total Campus Facility Growth 1950–1988

(2) U.S. institutions of higher learning have added approximately 1 billion gsf of space to their physical plants since 1974. Today, campus plant space totals at least 3 billion gsf and could total as much as 3.4 billion gsf.

- Our estimated 3 billion gsf of space was extrapolated from NCES data on the book value of annual building additions to plant since 1974. We calculated the annual cost per gsf of new construction using the Boeckh construction price index. The dollar value of additions to plant for each year (with adjustments for renovations of existing facilities) was divided by the cost of construction per gsf for each year to derive annual gsf additions to plant. Based on this approach, we estimate that higher education's plant currently occupies approximately 3 billion gsf of space.

- Our own survey data suggested a total physical plant size of 3.4 billion gsf across all institutional types. Therefore, it appears reasonable to say that the nation's higher education plant occupies *at least* 3 billion gsf and possibly more.

(3) The facilities of research, comprehensive, and two-year institutions comprise approximately 75% of total higher education plant.

- As the chart below indicates, 75% of all college and university space belongs to research, comprehensive, and two-year institutions. In aggregate, the facilities of all research institutions represent some 700 million gsf of space. Two-year institutions occupy approximately the same amount of space as a group. Comprehensive institutions have more than 800 million gsf of plant space.

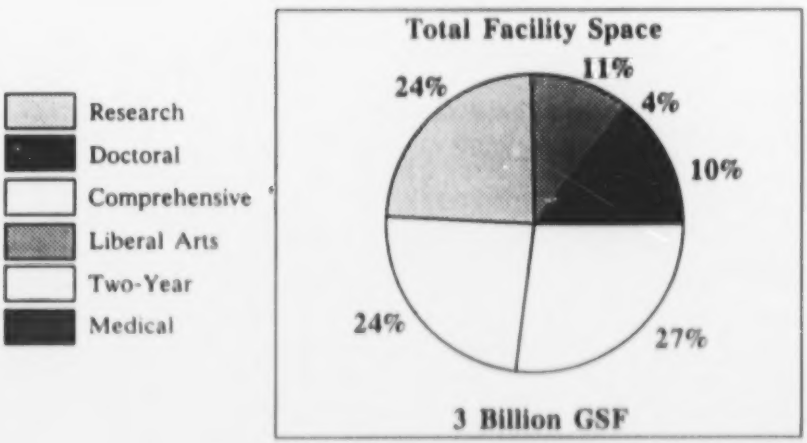

Figure 3

Total Facility Space by Type of Institution

- It should be noted that although two-year institutions have a relatively small average campus size (660,000 gsf), they represent about 50% of all institutions in the United States. Consequently, in aggregate, they represent a sizable portion of total space.

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(4) Research institutions have the largest average campus size with approximately 8.9 million gsf of facilities.

The chart below displays average facility size by type of institution. The chart differentiates between educational and general (E&G) buildings and auxiliary buildings. E&G building operations are supported by the educational and general funds of each institution. Auxiliary facilities are, in theory, self-supporting through the auxiliary enterprise activities housed in the facility (bookstores, dormitories, print shops, etc.).

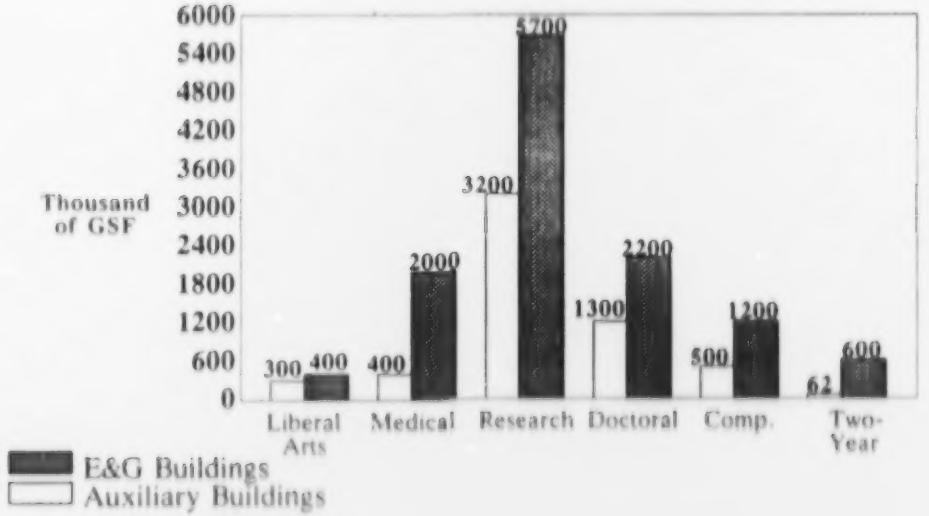

Figure 4

Average Facility Size by Type of Institution (In thousands of GSF)

3. American institutions of higher learning would have to invest approximately $300 billion to replace their facilities.

"We must recognize our responsibility to coming generations who stand to lose the most if we continue to defer problems rather than solve them."(4)

(1) Although there is no commonly accepted method for determining the replacement value of buildings, we have taken the term literally. What would it cost to reconstruct each square foot of existing facility space?

- Our survey results yielded a wide variety of replacement values. Survey respondents often reported insured values, appraised values, or did not know their facility replacement value. No universally accepted method of calculating the replacement value of educational facilities appears to exist.

- For the purposes of this report, we have assumed that replacement value means the cost of rebuilding all college and university facilities if they were razed and then reconstructed today.

- Determining this replacement value plus the total amount of space are crucial ingredients in understanding capital renewal/replacement needs. When combined with total plant size, replacement value provides a basis for calculating overall plant reinvestment needs.

(4) "Capital Renewal and Replacement/Deferred Maintenance," *Facilities Management: A Manual for Plant Administration*, published by APPA, 1984.

(2) On average, the replacement (reconstruction) cost of college and university facilities is approximately $101 per gsf.

- Our estimate of $101/gsf is an average derived from the following three sources:

  - The weighted average 1987 new construction costs per gsf for all types of facilities and for all types of institutions based on our survey data.

  - The weighted average 1988 new construction costs for all types of facilities and for all types of institutions based on our survey data.

  - A survey of APPA membership to determine average new construction costs.

- It should be noted that new construction costs varied by type of facility and geographic region. The cost estimates reflect weighted averages for each year (1987 and 1988). A $103 cost estimate was provided to us by APPA, independent of our survey results. Section eight of this chapter addresses construction costs by type of facility.

- The following chart outlines those costs for each source.

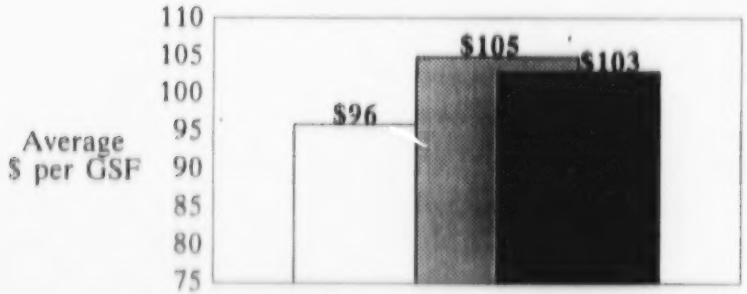

Figure 5

Average Construction Cost per GSF by Source

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(2) Based on a $101 cost per gsf, the 1988 replacement value of college and university physical plants is some $300 billion and possibly more.

- Depending on the amount of square feet (3 billion vs. 3.4 billion), the total replacement value could range from $303 billion to $343 billion. Using the lower end of this range, it would appear reasonable to state that plant replacement (reconstruction) value is at least $300 billion in 1988.

- Our survey revealed somewhat higher replacement values for college and university space than did NCES data. The present NCES figure estimates replacement value (1986) at approximately $200 billion. However, with a current replacement value per square foot of $101, the $200 billion figure would indicate a total national plant size of 2 billion gsf, approximately

the same amount as the early 1970s. Consequently, total plant replacement value would appear to be greater than the current NCES estimate.

- The following table outlines average replacement cost by institution type for 1988:

Type of Institution	E&G	Auxiliary	Total
Research	$576	$323	$899
Doctoral	222	131	353
Comprehensive	121	55	176
Liberal Arts	40	30	70
Two-Year	61	6	67
Medical	202	41	243

Figure 6

Average Plant Replacement Value in Millions of Dollars by Type of Institution

- On average, a research university would have to make the largest investment to replace its facilities; a two-year college would have to make the smallest investment.

4. The capital renewal/replacement needs of U.S. colleges and universities are currently estimated at $60 billion and possible more.

"We all know that the provision for funding major maintenance and rehabilitation has long been one of the main financial sores in higher education. Donors may give new buildings. They don't usually provide a 'Whittlesworth Memorial Replacement Roof.'"(5)

(1) "Capital renewal/replacement" refers to additions and improvements to plant which can be capitalized and are required because facility use or programs have changed. It also includes accumulated deferred maintenance.

- Ensuring an appropriate fit between the academic mission of an institution and its facilities is at the core of the term capital renewal/replacement. As student and research needs change, institutions must keep pace by providing up-to-date equipment and facilities. A laboratory appropriate for advanced research in the 1960s or 1970s may be quite inappropriate for research in the 1990s. Likewise, other facilities which do not meet today's educational needs must be brought up to current standards.

(5) Keynote remarks by John W. Pocock, Past Chairman of the Board, Association of Governing Boards of Universities and Colleges, at the 74th APPA Annual Meeting, July 14, 1987, New Orleans

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- Also included in the capital renewal/replacement needs of higher education institutions is accumulated deferred maintenance in such basic functional areas as plumbing, roofing, electrical systems, heating systems, and many others. While not glamorous, they represent fundamental facility needs for all institutions. Left undone, they can place a facility at functional or physical risk.

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(2) As noted previously, a 1974 NCES study indicated that 20% of all higher education facilities were in need of renewal, replacement, or termination.

- Much of the analytical work and writing done in this area has been undertaken by Harvey Kaiser, senior vice president at Syracuse University. His 1984 book *Crumbling Academe* attempted to quantify the dollars needed for capital repair and replacement nationally. Kaiser's approach was based on a 1974 NCES study which indicated that approximately 20% of all higher education space was in need of renewal, replacement, or termination. Using this and other data, he estimated building repair and replacement needs for 1981 of almost $30 billion based on a total plant replacement value of $143 billion.

- Inflation and the construction of new campus facilities have increased the replacement value of college and university buildings since Kaiser's 1984 work. As noted earlier, our analysis indicated a replacement value of about $300 billion.

(3) With a total building replacement value of $300 billion, college and university plants need some $60 billion in capital renewal/replacement funding.

- Using Kaiser's 1984 approach with the current estimated replacement value $300 billion, capital renewal/replacement needs would total $60 billion.

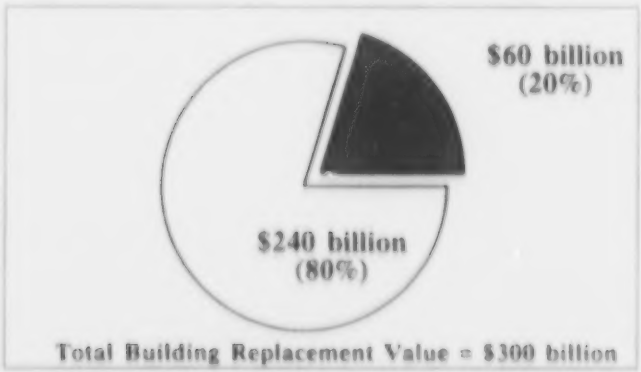

Figure 7

Capital Renewal/Replacement (As a % of Total Building Replacement Value)

- The $60 billion may be a conservative estimate. If one assumes that plant conditions have worsened since 1974 and that 25% of all space is now in need of renewal and replacement instead of 20%, the total need grows to $75 billion.

- Or, if a higher replacement value is used, the total need will exceed $60 billion. We estimated an overall replacement value of about $300 billion to $340 billion. Based on a $340 billion replacement value, national capital renewal/replacement needs total $70 billion.

- Whether the 20% figure is the same, more or less today, the need is quite large. Even at 15%, the capital renewal/replacement need would be $45 billion.

5. Priority repairs and renovations, or "urgent needs" at colleges and universities require an estimated $20.5 billion investment through 1988.

"Catch-up maintenance represents a sin of past fathers that will have to be borne by present children."(6)

(1) Urgent needs, defined as repairs and renovations which place facilities at risk if left undone, represent one-third of the $60 billion in capital renewal/replacement needs nationally.

- Of the total $60 billion in capital renewal and replacement funding needed by colleges and universities, some $20 billion is priority in nature.

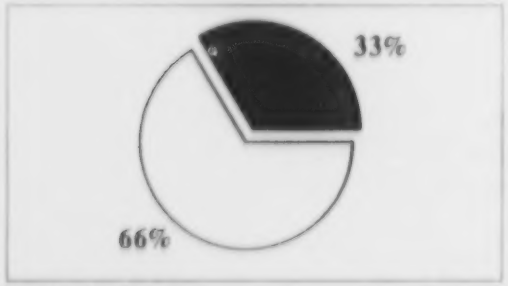

Figure 8

Urgent Needs as a % of Total Capital Renewal/Replacement Requirements

Urgent Needs (1/3) - $20 billion

Other Capital Renewal/Replacement Needs (2/3) - $40 billion

Total Capital Renewal/Replacement $60 billion

(6) John A. Dunn Jr., Vice President for Planning, Tufts University, at the 22nd Annual Meeting, Society for College and University Planners, July 21, 1987.

- These priority needs take the form of roof replacement, masonry work, HVAC systems, electrical systems, plumbing, and the like. While not glamorous as funding projects, they are essential for a functional physical plant.

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(2) There are two components of the estimated $20.5 billion investment needed to address priority needs: $14.4 billion for physical plant urgent needs which have accumulated through 1987, and an additional $6.1 billion in 1988 to ensure no deferred maintenance backlog at the beginning of fiscal 1989.

- The relatively large 1988 amount would appear curious at first. It may be the result of years of unattended minor problems which are now leading to more major physical problems with higher price tags. Or, the budget process might give college and universities a better handle on the cost of their present priority needs but a less firm estimate of backlogged needs.

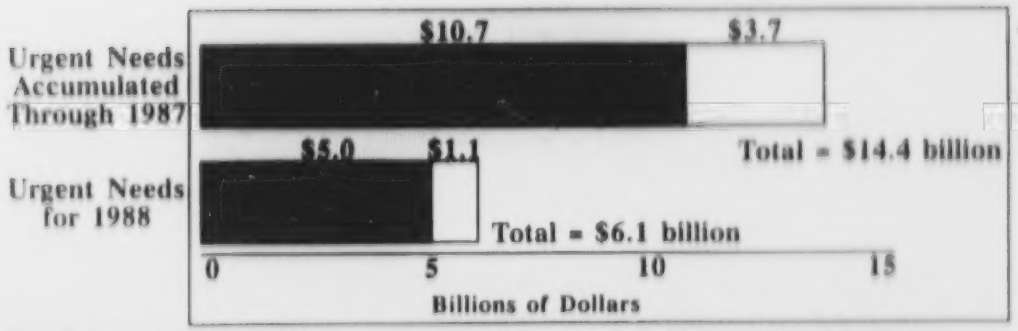

Figure 9

Total Physical Plant Urgent Needs

E&G Urgent Needs: $10.7 billion + $5.0 billion = $15.7 billion

Auxiliary Urgent Needs: $3.7 billion + $1.1 billion = $4.8 billion

Total Urgent Needs: $20.5 billion

- One recommended range for annual capital renewal funding is 1.5% to 3% of total replacement value of plant.(7) The $6.1 billion needed in 1988 represents approximately 2% of the total $300 billion replacement value of America's higher education plant.

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(3) The largest piece of the urgent need problem belongs to the nation's 104 research universities with an estimated need of $7.2 billion.

- In aggregate, urgent needs at research universities will cost an estimated $7.2 billion, or 35% of the total priority needs.

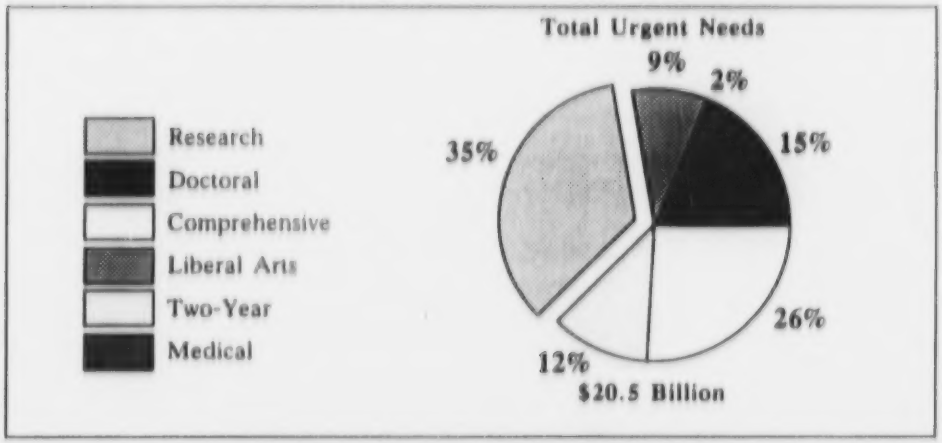

Figure 10

Total Urgent Needs by Type of Institution

- In addition, as a group, comprehensive institutions require $5.5 billion in funding, or 26%, and doctorate-granting institutions require an additional $3 billion, or 15% of the total.

(7) Kaiser, Harvey H. "Major Maintenance and Capital Renewal/Replacement Programs," August, 1987.

(4) Based on this survey the price tag ranges from $2.75 to $8.13 per square foot for the average U.S. college or university to attend to its physical plant urgent needs which have accumulated through fiscal 1988.

- On a per square foot basis, E&G and auxiliary urgent needs are as follows:

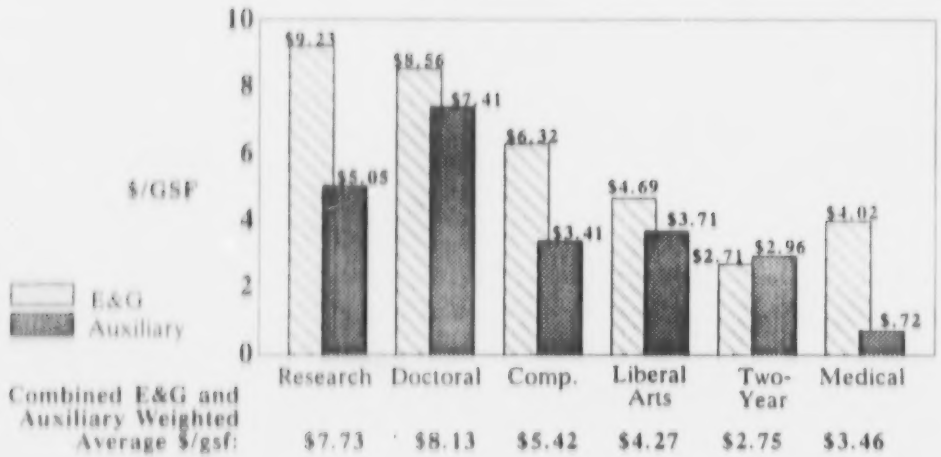

Figure 11

Urgent Needs Per Gross Square Foot

- Doctoral and research universities face the greatest overall priority needs at $8.13 and $7.73 per gsf, respectively.

- Two-year schools have the lowest overall urgent needs at $2.75 per gsf, perhaps due to the relatively young age of their facilities.

The table which follows provides an overview of priority needs by institutional type. Included are aggregate needs and needs per gross square foot.

	Total Priority Needs (millions)*	Average Priority Needs/GSF	Average Priority Needs as a % of Plant Replacement Value
Research	**$7,200**	**$7.73**	**7.6%**
Doctoral	**$3,100**	**$8.13**	**8.0%**
Comprehensive	**$5,300**	**$5.42**	**5.4%**
Liberal Arts	**$1,900**	**$4.27**	**4.2%**
Two-Year	**$2,500**	**$2.75**	**2.7%**
Medical	**$500**	**$3.46**	**3.4%**

* Total for all institutions as a group.

Figure 12

Summary of Priority Funding Needs by Institutional Type

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6. Building age, the size of plant expenditures, and the performance of facilities audits are factors which affect the reported levels of campus urgent needs.

"The most economical way to maintain the facilities on a campus is to invest in solving those problems early on, rather than to defer them. Nevertheless, deferral has occurred on a fairly massive scale on most campuses..."(8)

(1) As might be expected, the urgent needs of older campuses are greater than the urgent needs of younger campuses.

- Research universities with older campuses experience approximately 80% greater urgent needs on a gsf basis than younger campuses.

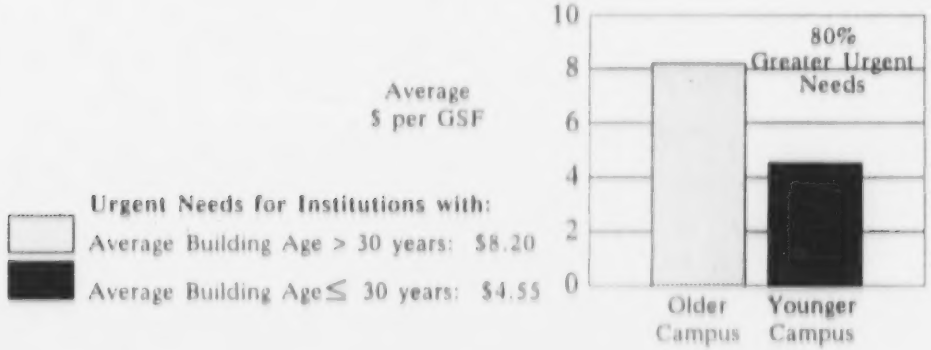

Figure 13

Urgent Needs Relative to Building Age for Research Universities

(8) Excerpts from Dr. Ronald Calgaard, President, Trinity University, from the "The View from the Top." *Facilities Manager* magazine, Winter, 1987.

- Older campuses (average building age greater than 30 years) were built during the post-World War II expansion period. The combination of age, under-investment, and speed of construction rather than quality of construction appear to have affected facility conditions adversely.

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(2) The size of plant operations and maintenance expenditures appears to affect the level of urgent need experienced by U.S. colleges and universities.

- Research universities which spend more than 5 percent of their current fund E&G expenditures on plant operations and maintenance (O&M) have approximately 20% fewer urgent needs per gsf than other research universities. Conversely, those that spend less than 5 percent have a higher level of priority need.

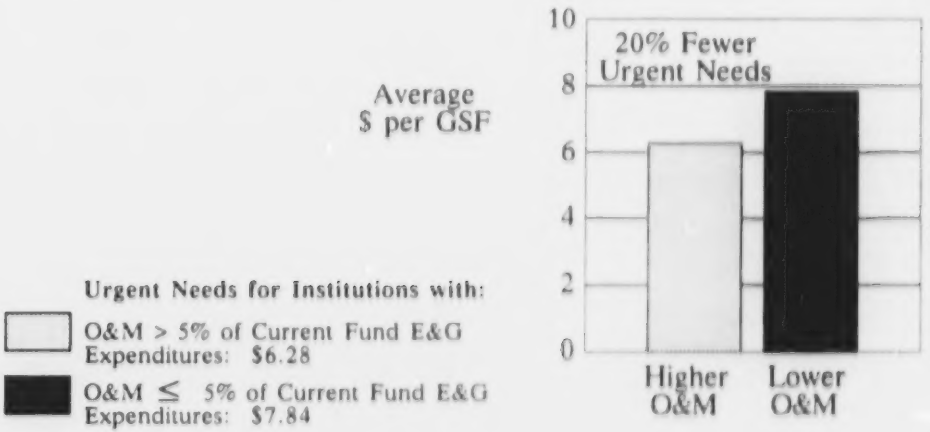

Figure 14

Urgent Needs Relative to Operations and Maintenance Expenditures for Research Universities

- There appears to be a correlation between ongoing O&M expenditures through an institution's operating budget and the level of urgent needs. Lower levels of O&M expenditures seem to produce higher levels of renewal/replacement needs.

- Aggregate operations and maintenance expenditures have declined in relation to overall E&G expenditures during the last few decades. This decline has contributed to the urgent need problem experienced by the nation's colleges and universities.

- According to NCES statistics, 1930 plant operations and maintenance expenditures were 16% of E&G expenditures. The percentage dropped to 13% for 1940 and 1950. Since 1960, aggregate operations and maintenance expenditures have been approximately 10% to 11% of overall E&G expenditures.

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(3) Colleges and universities which conduct periodic facilities audits report higher levels of urgent need than institutions which do not conduct facilities audits.

- A facilities audit evaluates the physical condition and functional adequacy of campus facilities. When conducted routinely and effectively, it products a record of facility characteristics and use, existing conditions, and an evaluation of maintenance, repair, and renovation needs.(9)

(9) Kaiser, Harvey H., *Crumbling Academe*, Association of Governing Boards of Universities and Colleges, 1984.

- Research universities which perform such audits report approximately 80% greater urgent needs per gsf than other research universities.

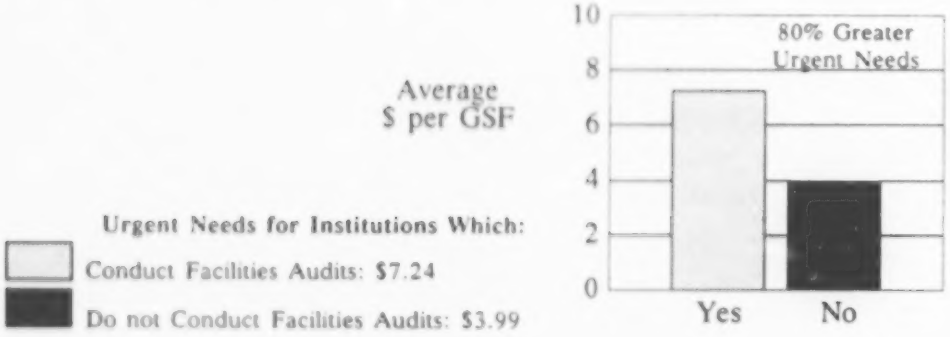

Figure 15

Urgent Needs Relative to Facilities Audits for Research Universities

- Facilities audits provide a knowledge base about the overall campus condition from which administrators can more accurately quantify their priority needs. Institutions which conduct facilities audits estimate higher levels of urgent need based on more knowledge.

- Over 80% of America's institutions of higher learning conduct periodic facilities audits. Well over half of these institutions perform biennial facilities audits.

- The implication for colleges and universities is significant. Many institutions do not have a good understanding of their facility needs. Without a thorough, ongoing facilities audit program, an institution may underestimate the gravity of its problem.

7. Facility reinvestment has not kept pace with the growing need.

"...a college's interest in making regular and proper provisions for capital renewal and replacement as well as for the new capital acquisitions...should stem from the desire to provide, in the twentieth century, an education which at least meets twentieth century standards, to students who will live most of their lives in the twenty-first.(10)

(1) U.S. colleges and universities deferred $4.00 of needed maintenance for every $1.00 spent in 1988.

- The nation's institutions of higher learning required $5 billion to correct their 1988 E&G urgent needs and an additional $1 billion for their 1988 auxiliary urgent needs for a total of $6 billion.

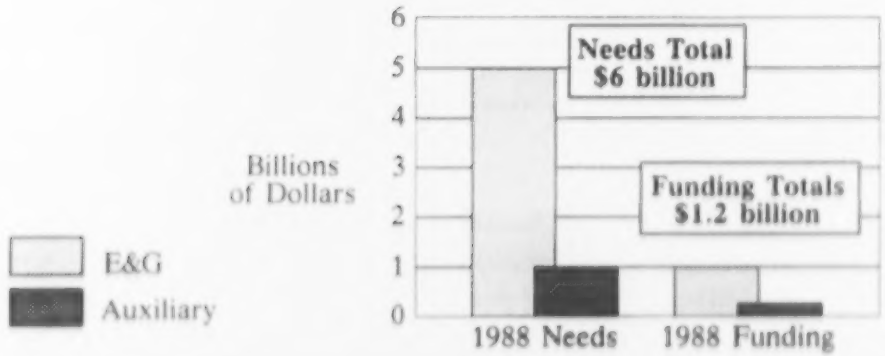

Figure 16
The Funding Gap

(10)Hans H. Jenny, *Hang-Gliding*, A Study of College and University Finance in the 1980s, underwritten by the Exxon Education Foundation.

- Budgeted expenditures for physical plant urgent needs in 1988 were estimated at $1.2 billion: $930 million for E&G buildings and $250 million for auxiliary buildings. These budgeted expenditures are in addition to ongoing O&M expenditures.

- A 1988 National Science Foundation study of research facilities at U.S. colleges and universities reported similar results. For every $1.00 these institutions plan to spend for facilities repair/renovation in 1988-89, another $3.60 of needed repair/renovation was deferred.(11)

- These figures provide some evidence that the backlog of deferred maintenance is growing at colleges and universities. If the 1988 figures are indicative of an ongoing trend, the priority need backlog would appear to be growing.

- In short, colleges and universities are "spending down" plant assets without an adequate understanding of the associated costs.

(11)"Scientific and Engineering Research Facilities at Universities and Colleges: 1988," National Science Foundation, September, 1988.

8. The average institution had more facilities under construction during 1987 than under renovation.

"You cannot have a core of excellence (in higher education) if you don't demonstrate a commitment to facilities. It's time to recognize that facilities provide the centerpiece around which all other functions (in higher education) take place."(12)

(1) The average institution had 51 thousand gsf of new plant space under construction and 27 thousand gsf of existing facility space under renovation during 1987.

- Two-year colleges – usually the youngest type of campus – had the least amount of construction and renovation activity in-progress during 1987. Approximately 22,000 gsf of new plant was under construction and about 10,000 gsf of existing plant space was under renovation during 1987.
- As the graph on the next page shows, research and doctoral institutions were constructing and renovating the greatest amount of space during 1987.
  - The average research university – already the largest type of institution – had about 321,000 gsf of new plant under construction and some 148,000 gsf of existing plant under renovation during 1987.
  - The average doctoral university was constructing some 81,000 gsf and renovating about 72,000 gsf of facility space during 1987.

(12) Keynote remarks by Dr. Ernest L. Boyer, President, the Carnegie Foundation for the Advancement of Teaching, at the 75th APPA Annual Meeting; July 27, 1988; Washington, D.C.

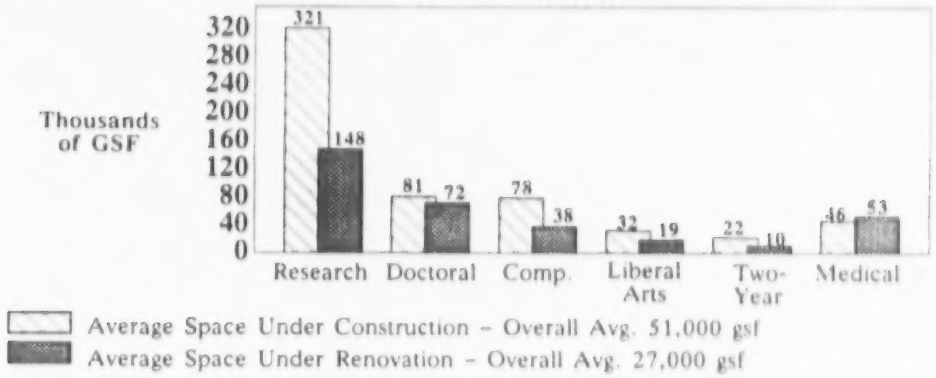

Figure 17

Avg. Space Under Construction and Renovation during 1987 by Type of Institution

- Colleges and universities planned to undertake similar construction and renovation projects in 1988. For example, research and doctoral institutions planned slightly more extensive new construction projects (representing about 337,000 and 90,000 gsf, respectively) and slightly less extensive renovation (representing approximately 110,000 and 64,000 gsf, respectively) in 1988.

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(2) It is not clear how much of institutional priority needs is being met through these construction and renovation activities.

- Some colleges and universities may choose to construct new facilities rather than renovate older facilities. Financing appears to be more readily available for new construction. It was noted previously that donors do not usually give a "Whittlesworth Memorial Replacement Roof."

- Few institutions demolish older buildings to construct new ones. As new facilities are build, the older ones are sometimes converted to different

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uses. In all likelihood, the more new construction a college undertakes, the more renovation is needed. The older replaced buildings must be renovated to make them suitable for their new use.

- Some of the renovations colleges and universities are currently undertaking address capital renewal/replacement needs, which include priority needs. Unfortunately, there is no way to tell how much of this renovation addresses priority needs. Nor is there a way to gauge how many of the renovations are necessitated by the construction of new facilities.

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(3) **For 1987 and 1988 projects combined, the overall average cost of new construction was $101 per gsf, while the overall average cost of renovation was $43 per gsf.**

- In aggregate, the cost of new construction was about $96 per gsf in 1987, which increased about 9% to $105 per gsf in 1988. The combined average cost for 1987 and 1988 construction projects was $101 per gsf.

- The overall average cost of renovation decreased about 27% from $49 per gsf in 1987 to $36 per gsf in 1988. The average cost of renovation projects for 1987 and 1988 combined was $43 per gsf.

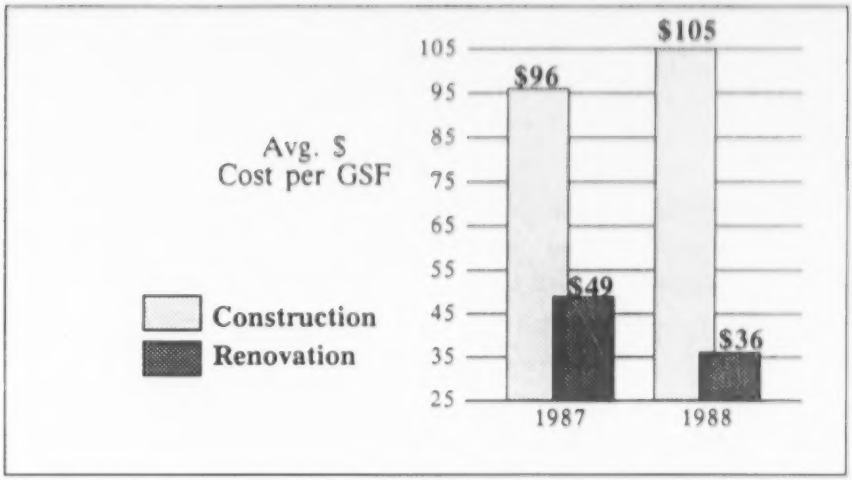

Figure 18

Overall Average Cost of Renovation and New Construction per GSF

- In general, institutions reported more widely varying costs for renovation than for new construction. The variance may reflect the greater diversity and extent of renovation projects.

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(4) Laboratories appear to be the most expensive type of facility to build.

- The cost of laboratory space for research institutions alone was approximately $185 per gsf in 1987 and $191 per gsf in 1988. The 1988 National Science Foundation study of Scientific and Engineering Research Facilities noted construction costs for research space of $192/gsf in 1986 and $288/gsf for 1988 and 1989 combined in 1989.

- Laboratory, classroom, office, and library space required overall average expenditures of $134, $102, $131, and $116 per gsf, respectively, over the two-year period from 1987 to 1988.

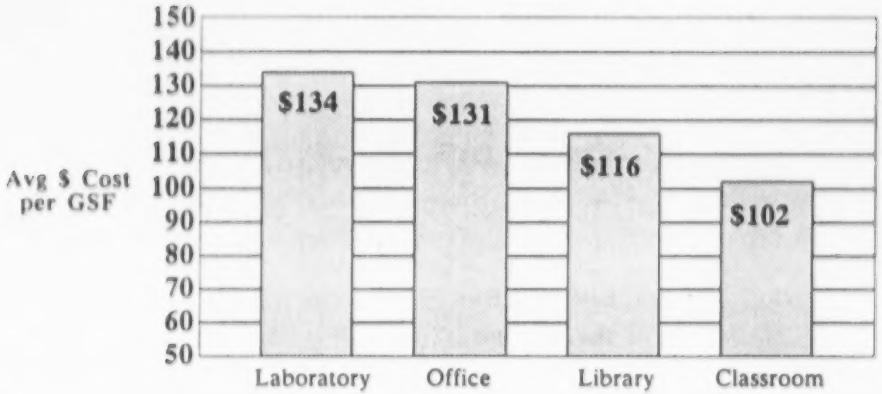

Figure 19

Cost of New Construction by Facility Type (1987 and 1988 Combined Average Cost per GSF)

- The average cost of laboratory construction at research facilities was $185 per gsf in 1987 and $191 per gsf in 1988.

The difference in the overall average cost of laboratory construction ($134 per gsf noted above) and the cost for research institution laboratories may be attributable to the nature of those facilities. Research institutions may be constructing more complex research laboratories whereas other institutions are constructing less complex classroom laboratories.

9. Classroom, laboratory, office and library space were the four most frequently cited priorities for construction and renovation.

- Overall, American colleges and universities cited classrooms and laboratory space most frequently as their top construction and renovation priorities.

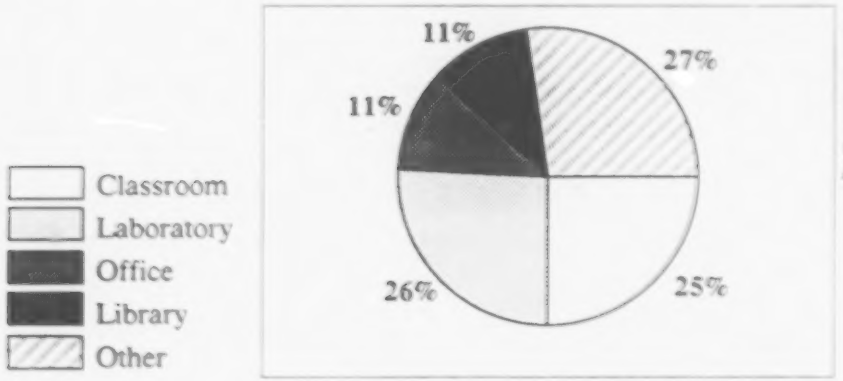

Figure 20

Future Facility Priorities for All Institutions (Frequency by Response)

- A 1987 survey conducted by the Society of College and University Planners produced similar results. Their respondents ranked classrooms, laboratory/research facilities, and offices as the facility types most urgently in need of rehabilitation and/or new construction.

- Research, doctoral, comprehensive, and two-year institutions cite classrooms and laboratory space as their top priorities.

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- Medical schools cited laboratory and health-related facilities most frequently as their top priorities.

- Liberal arts colleges cited classroom and residential facilities most frequently as their top priority.

10. The facilities master plan for many institutions does not include renewal/ replacement needs or deferred maintenance.

"Start thinking of your physical plant as a leaky bucket or it will drown you! You pour water into a leaky bucket, then you stop pouring. The water slowly runs out and the bucket is dry. You don't have any more water – not even when you are thirsty."(13)

(1) The majority of colleges and universities indicated that they use a master plan. However, it could not be determined how up-to-date these plans are.

- The master facilities plan appears to be most widely used at research universities, which have larger more complex campuses. About 98% of research universities have master facilities plans. Liberal arts colleges appeared least likely to use a master facilities plan. Only 79% have such a plan.

- The responding institutions did not indicate how complete or up-to-date their facilities master plans were.

(13) Stephen Trachtenberg, President, George Washington University, from *AGB Reports*.

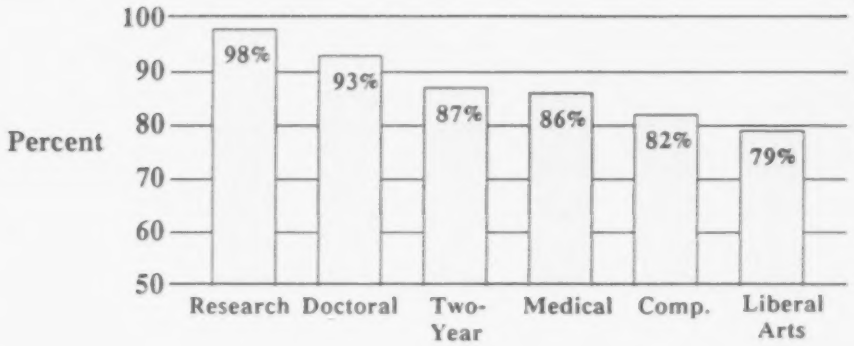

Figure 21
Percent of Institutions Which Have a Master Facilities Plan

(2) Among the institutions with a master facilities plan, many do not include renewal/replacement in their master facilities plan.

- Virtually all institutions with a master facilities plan include plans for new construction. Far fewer plan deferred maintenance and renewal/replacement projects.

- Although 98% of research universities use master facilities plans, only 69% of these institutions plan renewal/replacement projects. Only 14% of medical schools with a master facilities plan include deferred maintenance projects in their planning. A breakdown by institutional type can be found on the following page.

	Percent of Plans Which Include:		
	New Const.	Renew/Replace.	Deferred Maint.
Research	98%	69%	73%
Doctoral	79%	72%	68%
Comprehensive	76%	59%	51%
Liberal Arts	67%	50%	50%
Two-Year	77%	71%	43%
Medical	86%	57%	14%

Figure 22

Components of Master Facility Plans by Institution Type

11. Institutions rely primarily on tax-exempt bonds and state funding to finance their capital projects.

"The vitality of the higher education enterprise in this country is in jeopardy. The most heavily endowed campuses and those operating on a slim margin of tuition revenues and local government appropriations are not spared from the capital renewal and replacement dilemma."(14)

(1) Research universities rely on state funding and the proceeds of tax-exempt bonds to finance their construction and renovation projects.

- Approximately 60% of the funds needed in 1987 came from tax-exempt bonds and state funding (primarily among public research institutions).
- About 45% of the funds needed in 1988 for construction and renovation projects came from tax-exempt bonds and state funds.
- Other funding sources included institutional financing, private loans, and federal funds.

(2) Similar financing sources were utilized by most institutions to fund capital projects during 1987 and 1988.

(14)Dr. Harvey H. Kaiser, *Crumbling Academe*, 1984, published by the Association of Governing Boards of Universities and Colleges.

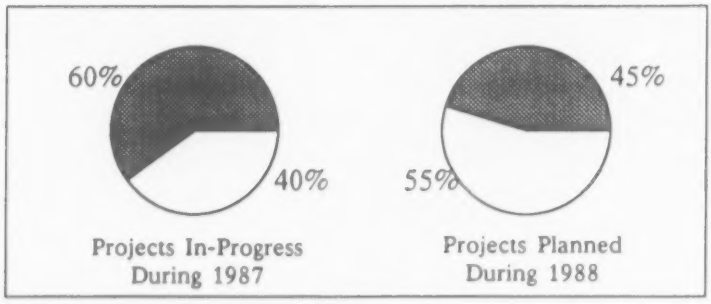

Figure 23

Financing Sources for Renovation and Construction Projects – Research Universities

- State funding was one of the top two preferred sources of financing for most public colleges and universities during 1987 and 1988. Liberal arts colleges rely on institutional funds, tax-exempt bonds, and other sources of financing. Approximately 94% of liberal arts colleges are private institutions.

- Tax-exempt bonds were among the top three preferred sources of financing for all types of colleges and universities during 1987 and 1988, except medical schools.

- Higher education has relied heavily on tax-exempt debt financing in prior years for various capital purposes. The nation's colleges and universities floated an estimated $20 billion of tax-exempt debt from 1981 to 1986.

- Although most institutions plan to rely, at least in part, on tax-exempt bonds to finance their master plans, the 1986 tax law established a $150 million per institution cap on tax-exempt non-hospital bonds outstanding at any one time effective beginning in 1987. As a result, some of the largest private universities may be effectively shut out of the tax-exempt bond market.

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(3) **The combination of debt ceilings, other tax law changes, and limited institutional debt capacity may constrain higher education's ability to fund capital renewal/replacement needs.**

- Although the vast majority of institutions have not reached the $150 million debt ceiling imposed by the 1986 tax law, many large research institutions have reached or exceeded the threshold. With an aggregate $7.2 billion priority need among research institutions, tax-exempt debt financing may not be an option for this group of institutions to fund their requirements.

- Taxable bonds have become a more viable financing vehicle for higher education since tax reform. Although the interest costs of taxable debt are higher, the legal constraints on tax-exempt debt imposed by the Tax Reform Act of 1987 are such that the spread between the two types of debt has narrowed. However, the novelty of higher education issues in the taxable market make quantifying the real cost differences difficult. The novelty factor may also limit the use of taxable debt to "name" institutions for the near future.

- Recent changes in the tax law may affect charitable giving by individuals, foundations, and corporations. Although the long-term effect of these changes on charitable giving cannot be fully determined, it may reduce the overall growth in gift income.

- There are also limits to the amount of debt an institution can take on. The level of existing debt plus the unique financial circumstances of an individ-

bonds or loans. State institutions can seek state funding but even that is becoming more difficult as state budgets become tighter. Private institutions without access to state capital will have to rely on institutional funds (reserves, gifts, internal borrowing) to meet their needs. However, many institutions do not have internal resources in the needed amounts.

- Determining the amount of needed capital renewal and replacement will solve only part of the problem. Funding these large and growing needs will be quite another problem.

Chapter Three

Conclusions

Conclusions

America's deteriorating college and university facilities require substantial capital investment. With an estimated $60 to $70 billion in capital renewal and replacement needs, some $20 billion of which is urgent or priority in nature, the reinvestment requirements are staggering. Viewed another way, $60 billion represents 55 percent of the total operating expenditures ($108 billion) of all colleges and universities in 1986. And the needs are growing.

One of the great difficulties with capital renewal and replacement is its lack of glamour. As noted previously, donors "don't usually provide a 'Whittlesworth Memorial Replacement Roof'." Electrical systems, plumbing, masonry, and roofs are not the stuff of fund raising case statements. However, these items are precisely the needs of most institutions.

Much attention has been given to endowment management in recent years. The focus of these efforts has been to maintain payout rates equal to or above inflation rates while protecting principal. The goal has been to maintain the "purchasing power" of the endowment. *Facilities also represent an endowment* provided by donors, taxpayers, and students (through tuition) to each institution. Yet, considerably less attention has been focused on maintaining the "functional" or "educational power" of plant assets. Unlike most institutional endowments, facilities are providing less value to many institutions than they did 15 or 20 years ago. Colleges and universities are "spending down" capital assets without clearly understanding or recognizing the associated costs.

Higher education faces two basic issues in the area of capital renewal and replacement. The first is quantifying and funding the accumulated backlog of

capital needs. The second is developing an ongoing funding plan to ensure that backlogs do not accumulate in the future. Both issues must be addressed in tandem if institutions are to avoid a perpetual mode of catch-up.

This study was only a start at quantifying and tracking the need. Much more work needs to be done.

- At the institutional level, governing boards must take existing facility needs into account when making resource allocation decisions. Better funding balance must be achieved between operating needs, new facilities, and existing facilities. Likewise, institutional managers must undertake on-going, comprehensive facilities audits to determine both current and future requirements.

- At the national level, policy makers within government and the higher education industry must continue to address this most pressing issue. A starting point would be a comprehensive national survey on the scale of 1974 study. The combined efforts of government, higher education associations and individual institutions could contribute greatly to knowledge and education on this topic.

- Financing alternatives must be examined. The needs are great, yet many institutions lack access to the capital required to correct the backlog of facility problems *and* to fund future needs. How and when these facility investments are made will determine the future adequacy of higher education facilities.

- Lastly, correcting the current accumulated backlog of facility needs is only part of the problem. A second part is ongoing funding of facilities to ensure that the problem does not occur again. Current initiatives by APPA,

NACUBO, and the Society of College and University Planners will provide higher education institutions with some approaches and models for balancing these two issues.

The capital renewal and replacement dilemma can be solved. The solution will require knowledge and education among all concerned parties. The dilemma must be solved if America is to have the facilities to meet the educational needs of our society in the 1990s and beyond.

Part Two

Chapter Four – Institutional Profiles by Type

Chapter Five – Technical Notes

Chapter Six – Suggested Readings

Chapter Seven – Glossary of Terms

Chapter Four

Institutional Profiles by Type

The following pages provide survey results by type of institution.

The major categories of data are as follows:

- Physical Plant Characteristics
- Financial Information
- Physical Plant Funding
- Levels Of Urgent Needs
- Facilities Audits
- Master Plans
- 1987 Construction And Renovation
- 1988 Construction And Renovation
- Construction/Renovation Priorities
- Financing Sources

Research Universities

Profile of the Average Research University

Physical Plant Characteristics	E&G Average	Auxiliary Average
Number of Buildings	269	116
Age of Buildings	36	29
Gross Square Feet of Buildings	5,700,000	3,200,000
Net Assignable Square Feet of Buildings	3,600,000	2,200,000

Financial Information	E&G Average (000s omitted)	Auxiliary Average (000s omitted)
Plant Fund Assets (Book Value)	$485,824	$157,595
Building Assets (Book Value)	$271,624	$113,384
Building Assets (Replacement Value)	$575,700	$323,200

Plant Funding Requirements

Actual Fiscal '87 Expenditures for:	E&G Average (000s omitted)	Auxiliary Average (000s omitted)
Normal Maintenance	$9,978	$3,143
Renewal/Replacement Maintenance	$2,472	$1,473
Unscheduled Major Maintenance	$620	$1,177
Urgent Needs	$1,593	$254
Renovation and Alterations	$6,148	$3,934
New Construction	$15,031	$7,318

Levels of Urgent Need:	E&G Average	Auxiliary Average
Accumulated Through Fiscal 1987	$37,000,000	$10,600,000
$ per Gross Square Foot	$6.94	$3.84
Required for Fiscal 1988	$13,100,000	$3,900,000
$ per Gross Square Foot	$2.29	$1.21

Facilities Audits and Master Plans

Facilities Audits (E&G only)	Yes	No
Do you conduct periodic facilities audits?	93%	7%
If yes, what audit method do you use?		
Formula	5%	
Walk-through	75%	
Other	11%	
Combination	9%	
If yes, what is the frequency of audits?		
More than once per year	20%	
Every 1–2 years	49%	
Every 3 years or less	31%	

Master Facilities Plan	Yes	No
Do you have a master facilities plan?	98%	2%
If yes, does it include the following:		
New Construction?	98%	
Renewal/Replacement?	69%	
Deferred Maintenance?	73%	
Alterations/Renovations?	91%	

1987 Construction and Renovation Projects

	Average Sq. Ft. (000s omitted)	Average Cost (000s omitted)
1987 Renovation Projects	148	$13,501
1987 New Construction Projects	321	$43,847

1987 Financing Sources:	Percentage of Use
1. Tax-Exempt Bonds	35%
2. State Funds	25%
3. Other Sources	15%
4. Institutional Financing	8%
5. Federal Funds	6%
6. Internal Borrowing	5%*
7. Private Loans	4%
8. Taxable Bonds	2%*

* Average based on <5 responses

1988 Construction and Renovation Projects

	Average Sq. Ft. (000s omitted)	Average Cost (000s omitted)
1988 Renovation Projects	110	$6,020
1988 New Construction Projects	337	$25,995

1988 Financing Sources:	Percentage of Use
1. Tax-Exempt Bonds	25%
2. State Funds	20%
3. Other Sources	15%
4. Institutional Financing	13%
5. Private Loans	9%
6. Taxable Bonds	8%•
7. Federal Funds	5%
8. Internal Borrowing	5%•

• Average based on <5 responses

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Future Construction and Renovation Requirements

Future Priorities:	Frequency of Mention
1. Laboratory Facilities	31%
2. Classroom Facilities	26%
3. Office Facilities	9%
4. Library Facilities	9%

Future Financing Sources: (Average annual requirements over 5-year period beginning in fiscal 1989)	Percentage of Use
1. State Funds	40%
2. Tax-Exempt Bonds	20%
3. Institutional Financing	16%
4. Private Loans	8%*
5. Other Sources	8%*
6. Federal Funds	7%*
7. Internal Borrowing	1%*
8. Taxable Bonds**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

Doctorate-Granting Universities

Profile of the Average Doctorate-Granting University

Physical Plant Characteristics	E&G Average	Auxiliary Average
Number of Buildings	79	57
Age of Buildings	38	35
Gross Square Feet of Buildings	2,200,000	1,300,000
Net Assignable Square Feet of Buildings	1,500,000	870,000

Financial Information	E&G Average (000s omitted)	Auxiliary Average (000s omitted)
Plant Fund Assets (Book Value)	$145,066	$39,167
Building Assets (Book Value)	$82,104	$29,633
Building Assets (Replacement Value)	$222,200	$131,300

Plant Funding

Actual Fiscal '87 Expenditures for:	E&G Average (000s omitted)	Auxiliary Average (000s omitted)
Normal Maintenance	$3,755	$2,081
Renewal/Replacement Maintenance	$735	$465
Unscheduled Major Maintenance	$79	$40
Urgent Needs	$435	$223
Renovation and Alterations	$1,093	$1,351
New Construction	$3,409	$2,162

Levels of Urgent Need:	E&G Average	Auxiliary Average
Accumulated Through Fiscal 1987	$13,000,000	$6,700,000
$ per Gross Square Foot	$6.01	$5.95
Required for Fiscal 1988	$5,600,000	$1,900,000
$ per Gross Square Foot	$2.55	$1.46

Facilities Audits and Master Plans

Facilities Audits (E&G only)	Yes	No
Do you conduct periodic facilities audits?	87%	13%
If yes, what audit method do you use?		
Formula	0%	
Walk-through	72%	
Other	10%	
Combination	18%	
If yes, what is the frequency of audits?		
More than once per year	11%	
Every 1-2 years	65%	
Every 3 years or less	24%	

Master Facilities Plan	Yes	No
Do you have a master facilities plan?	93%	7%
If yes, does it include the following:		
New Construction?	79%	
Renewal/Replacement?	72%	
Deferred Maintenance?	68%	
Alterations/Renovations?	78%	

1987 Construction and Renovation Projects

	Average Sq. Ft. (000s omitted)	Average Cost (000s omitted)
1987 Renovation Projects	72	$3,993
1987 New Construction Projects	81	$9,145

1987 Financing Sources:	Percentage of Use
1. Other Sources	30%
2. State Funds	19%
3. Tax-Exempt Bonds	17%
4. Taxable Bonds	15%*
5. Federal Funds	13%
6. Institutional Funds	6%
7. Private Loans**	
8. Internal Borrowing**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

1988 Construction and Renovation Projects

	Average Sq. Ft. (000s omitted)	Average Cost (000s omitted)
1988 Renovation Projects	64	$3,103
1988 New Construction Projects	90	$9,900

1988 Financing Sources:	Percentage of Use
1. Tax-Exempt Bonds	24%
2. State Funds	23%
3. Federal Funds	19%
4. Internal Borrowing	12%*
5. Other Sources	11%
6. Institutional Funds	11%
7. Taxable Bonds**	
8. Private Loans**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

Future Construction and Renovation Requirements

Future Priorities:	Frequency of Mention
1. Laboratory Facilities	26%
2. Classroom Facilities	21%
3. Library Facilities	16%

Future Financing Sources: (Average annual requirements over 5-year period beginning in fiscal 1989)		Percent of Use
	1. Other Sources	32%
	2. State Funds	22%
	3. Tax-Exempt Bonds	11%
	4. Federal Funds	11%*
	5. Institutional Funds	10%
	6. Private Loans	7%*
	7. Internal Borrowing	7%*
	8. Taxable Bonds**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

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Comprehensive Universities and Colleges

Profile of the Average Comprehensive University/College

Physical Plant Characteristics	E&G Average	Auxiliary Average
Number of Buildings	48	22
Age of Buildings	29	23
Gross Square Feet of Buildings	1,200,000	540,000
Net Assignable Square Feet of Buildings	800,000	370,000

Financial Information	E&G Average (000s omitted)	Auxiliary Average (000s omitted)
Plant Fund Assets (Book Value)	$77,446	$24,055
Building Assets (Book Value)	$51,659	$24,974
Building Assets (Replacement Value)	$121,200	$54,540

Plant Funding

Actual Fiscal '87 Expenditures for:	E&G Average (000s omitted)	Auxiliary Average (000s omitted)
Normal Maintenance	$2,671	$918
Renewal/Replacement Maintenance	$569	$250
Unscheduled Major Maintenance	$138	$259
Urgent Needs	$356	$102
Renovation and Alterations	$1,837	$263
New Construction	$3,533	$3,927

Levels of Urgent Need:	E&G Average	Auxiliary Average
Accumulated Through Fiscal 1987	$4,100,000	$1,400,000
$ per Gross Square Foot	$4.49	$2.28
Required for Fiscal 1988	$2,200,000	$610,000
$ per Gross Square Foot	$1.83	$1.13

Facilities Audits and Master Plans

Facilities Audits (E&G only)	Yes	No
Do you conduct periodic facilities audits?	94%	6%
If yes, what audit method do you use?		
Formula	1%	
Walk-through	68%	
Other	7%	
Combination	24%	
If yes, what is the frequency of audits?		
More than once per year	23%	
Every 1-2 years	62%	
Every 3 years or less	15%	

Master Facilities Plan	Yes	No
Do you have a master facilities plan?	82%	18%
If yes, does it include the following:		
New Construction?	76%	
Renewal/Replacement?	59%	
Deferred Maintenance?	51%	
Alterations/Renovations?	72%	

1987 Construction and Renovation Projects

	Average Sq. Ft. (000s omitted)	Average Cost (000s omitted)
1987 Renovation Projects	38	$1,389
1987 New Construction Projects	78	$6,103

1987 Financing Sources:	Percentage of Use
1. Tax-Exempt Bonds	45%
2. State Funds	26%
3. Other Sources	13%
4. Federal Funds	6%
5. Institutional Funds	6%
6. Taxable Bonds	4%
7. Private Loans**	
8. Internal Borrowing**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

1988 Construction and Renovation Projects

	Average Sq. Ft. (000s omitted)	Average Cost (000s omitted)
1988 Renovation Projects	29	$1,052
1988 New Construction Projects	68	$5,566

1988 Financing Sources:	Percentage of Use
1. Internal Borrowing	41%*
2. Tax-Exempt Bonds	18%
3. State Funds	17%
4. Other Sources	8%
5. Federal Funds	8%*
6. Institutional Funds	6%
7. Private Loans	2%*
8. Internal Borrowing**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

Future Construction and Renovation Requirements

Future Priorities:	Frequency of Mention
1. Classroom Facilities	26%
2. Laboratory Facilities	21%
3. Library Facilities	13%

Future Financing Sources:
(Average annual requirements over 5-year period beginning in fiscal 1989)

	Percentage of Use
1. State Funds	36%
2. Tax-Exempt Bonds	21%
3. Taxable Bonds	16%*
4. Other Sources	10%
5. Institutional Funds	9%
6. Private Loans	5%*
7. Federal Funds	3%*
8. Internal Borrowing**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

Liberal Arts Colleges

Profile of the Average Liberal Arts College

Physical Plant Characteristics	E&G Average	Auxiliary Average
Number of Buildings	29	43
Age of Buildings	52	45
Gross Square Feet of Buildings	400,000	300,000
Net Assignable Square Feet of Buildings	210,000	190,000

Financial Information	E&G Average (000s omitted)	Auxiliary Average (000s omitted)
Plant Fund Assets (Book Value)	$38,424	$16,029
Building Assets (Book Value)	$22,749	$11,518
Building Assets (Replacement Value)	$40,400	$30,300

Plant Funding

Actual Fiscal '87 Expenditures for:	E&G Average (000s omitted)	Auxiliary Average (000s omitted)
Normal Maintenance	$1,124	$652
Renewal/Replacement Maintenance	$390	$246
Unscheduled Major Maintenance	$78*	$44*
Urgent Needs	$124	$68
Renovation and Alterations	$341	$238
New Construction	$1,737	$3,030*

Levels of Urgent Need:	E&G Average	Auxiliary Average
Accumulated Through Fiscal 1987	$2,900,000	$1,450,000
$ per Gross Square Foot	$3.36	$2.99*
Required for Fiscal 1988	$530,000	$215,000
$ per Gross Square Foot	$1.33	$.72

* Average based on <5 responses

Facilities Audits and Master Plans

Facilities Audits (E&G only)	Yes	No
Do you conduct periodic facilities audits?	100%	0%
If yes, what audit method do you use?		
Formula	0%	
Walk-through	82%	
Other	18%	
Combination	0%	
If yes, what is the frequency of audits?		
More than once per year	17%	
Every 1–2 years	17%	
Every 3 years or less	66%	

Master Facilities Plan	Yes	No
Do you have a master facilities plan?	79%	21%
If yes, does it include the following:		
New Construction?	67%	
Renewal/Replacement?	50%	
Deferred Maintenance?	50%	
Alterations/Renovations?	42%	

1987 Construction and Renovation Projects

	Average Sq. Ft. (000s omitted)	Average Cost (000s omitted)
1987 Renovation Projects	19	$1,076
1987 New Construction Projects	32	$2,989

1987 Financing Sources:	Percentage of Use
1. Tax-Exempt Bonds	67%
2. Other Sources	20%*
3. Institutional Funds	13%*
4. Taxable Bonds**	
5. Private Loans**	
6. Internal Borrowing**	
7. State Funds**	
8. Federal Funds**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

1988 Construction and Renovation Projects

	Average Sq. Ft. (000s omitted)	Average Cost (000s omitted)
1988 Renovation Projects	33	$897
1988 New Construction Projects	3	$605

1988 Financing Sources:	Percentage of Use
1. Institutional Funds	66%
2. Tax-Exempt Bonds	34%*
3. Taxable Bonds**	
4. Private Loans**	
5. Internal Borrowing**	
6. State Funds**	
7. Federal Funds**	
8. Other Sources**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

Future Construction and Renovation Requirements

Future Priorities:	Frequency of Mention
1. Classroom Facilities	24%
2. Residential Facilities	21%
3. Other Facilties	21%

Future Financing Sources: (Average annual requirements over 5-year period beginning in fiscal 1989)		Percentage of Use
	1. Institutional Funds	63%*
	2. Tax-Exempt Bonds	37%*
	3. Taxable Bonds**	
	4. Private Loans**	
	5. Internal Borrowing**	
	6. State Funds**	
	7. Federal Funds**	
	8. Other Sources**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

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Two-Year Community, Junior, and Technical Colleges

Profile of the Average Two-Year Community, Junior, and Technical Colleges

Physical Plant Characteristics	E&G Average	Auxiliary Average
Number of Buildings	26	4
Age of Buildings	16	21
Gross Square Feet of Buildings	600,000	62,000
Net Assignable Square Feet of Buildings	500,000	40,000

Financial Information	E&G Average (000s omitted)	Auxiliary Average (000s omitted)
Plant Fund Assets (Book Value)	$53,135	$4,362*
Building Assets (Book Value)	$39,291	$6,322*
Building Assets (Replacement Value)	$60,600	$6,260

* Average based on <5 responses

Plant Funding

Actual Fiscal '87 Expenditures for:	E&G Average (000s omitted)	Auxiliary Average (000s omitted)
Normal Maintenance	$1,527	$54
Renewal/Replacement Maintenance	$487	$22*
Unscheduled Major Maintenance	$68	$11*
Urgent Needs	$208	$6*
Renovation and Alterations	$663	$49*
New Construction	$2,413	$101*

Levels of Urgent Need:	E&G Average	Auxiliary Average
Accumulated Through Fiscal 1987	$525,000	$60,000*
$ per Gross Square Foot	$1.16	$2.80*
Required for Fiscal 1988	$930,000	$10,000*
$ per Gross Square Foot	$1.55	$.16*

* Average based on <5 responses

Facilities Audits and Master Plans

Facilities Audits (E&G only)	Yes	No
Do you conduct periodic facilities audits?	81%	19%
If yes, what audit method do you use?		
Formula	0%	
Walk-through	88%	
Other	4%	
Combination	8%	
If yes, what is the frequency of audits?		
More than once per year	29%	
Every 1–2 years	62%	
Every 3 years or less	9%	

Master Facilities Plan	Yes	No
Do you have a master facilities plan?	87%	13%
If yes, does it include the following:		
New Construction?	77%	
Renewal/Replacement?	71%	
Deferred Maintenance?	43%	
Alterations/Renovations?	74%	

1987 Construction and Renovation Projects

	Average Sq. Ft. (000s omitted)	Average Cost (000s omitted)
1987 Renovation Projects	10	$477
1987 New Construction Projects	22	$2,168

1987 Financing Sources:	Percentage of Use
1. Tax-Exempt Bonds	54%
2. State Funds	27%
3. Institutional Funds	13%
4. Other Sources	6%
5. Taxable Bonds**	
6. Private Loans**	
7. Internal Borrowing**	
8. Federal Funds**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

1988 Construction and Renovation Projects

	Average Sq. Ft. (000s omitted)	Average Cost (000s omitted)
1988 Renovation Projects	42	$1,525
1988 New Construction Projects	42	$3,111

1988 Financing Sources:	Percentage of Use
1. Tax-Exempt Bonds	74%*
2. State Funds	15%
3. Other Sources	6%
4. Institutional Funds	5%
5. Taxable Bonds**	
6. Private Loans**	
7. Internal Borrowing**	
8. Federal Funds	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

Future Construction and Renovation Requirements

Future Priorities:	Frequency of Mention
1. Laboratory Facilities	36%
2. Classroom Facilities	28%
3. Office Facilities	10%

Future Financing Sources:
(Average annual requirements over 5-year period beginning in fiscal 1989)

	Percentage of Use
1. Tax-Exempt Bonds	57%*
2. State Funds	28%
3. Institutional Funds	8%
4. Other Sources	7%*
5. Taxable Bonds**	
6. Private Loans**	
7. Internal Borrowing**	
8. Federal Funds**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

Medical Schools and Medical Centers

Profile of the Average Medical School/Center

Physical Plant Characteristics	E&G Average	Auxiliary Average
Number of Buildings	28	17
Age of Buildings	24	16
Gross Square Feet of Buildings	2,000,000	407,000
Net Assignable Square Feet of Buildings	1,100,000	220,000

Financial Information	E&G Average (000s omitted)	Auxiliary Average (000s omitted)
Plant Fund Assets (Book Value)	$191,394	$12,303*
Building Assets (Book Value)	$101,927	$11,592*
Building Assets (Replacement Value)	$202,000	$41,110

Plant Funding

Actual Fiscal '87 Expenditures for:	E&G Average (000s omitted)	Auxiliary Average (000s omitted)
Normal Maintenance	$1,914	$108
Renewal/Replacement Maintenance	$704*	$1,010*
Unscheduled Major Maintenance	$172	$103*
Urgent Needs	$170*	**
Renovation and Alterations	$1,768	$64*
New Construction	$2,378	$245*

Levels of Urgent Need:	E&G Average	Auxiliary Average
Accumulated Through Fiscal 1987	$4,100,000	$130,000
$ per Gross Square Foot	$2.42	$.45
Required for Fiscal 1988	$3,200,000*	$110,000*
$ per Gross Square Foot	$1.60*	$.27*

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

Facilities Audits and Master Plans

Facilities Audits (E&G only)	Yes	No
Do you conduct periodic facilities audits?	83%	17%
If yes, what audit method do you use?		
Formula	20%	
Walk-through	20%	
Other	0%	
Combination	60%	
If yes, what is the frequency of audits?		
More than once per year	0%	
Every 1–2 years	75%	
Every 3 years or less	25%	

Master Facilities Plan	Yes	No
Do you have a master facilities plan?	86%	14%
If yes, does it include the following:		
New Construction?	86%	
Renewal/Replacement?	57%	
Deferred Maintenance?	14%	
Alterations/Renovations?	71%	

1987 Construction and Renovation Projects

	Average Sq. Ft. (000s omitted)	Average Cost (000s omitted)
1987 Renovation Projects	53	$2,838
1987 New Construction Projects	46	$5,241

1987 Financing Sources:	Percentage of Use
1. State Funds	72%
2. Institutional Funds	28%
3. Tax-Exempt Bonds**	
4. Taxable Bonds**	
5. Private Loans**	
6. Internal Borrowing**	
7. Federal Funds**	
8. Other Sources**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

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1988 Construction and Renovation Projects

	Average Sq. Ft. (000s omitted)	Average Cost (000s omitted)
1988 Renovation Projects	25	$1,459
1988 New Construction Projects	45	$6,770

1988 Financing Sources:	Percentage of Use
1. Other Sources	88%*
2. State Funds	8%*
3. Institutional Funds	4%
4. Tax-Exempt Bonds**	
5. Taxable Bonds**	
6. Private Loans**	
7. Internal Borrowing**	
8. Federal Funds**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

Future Construction and Renovation Requirements

Future Priorities:	Frequency of Mention
1. Laboratory Facilities	31%
2. Health Related Facilities	31%
3. Office Facilities	23%

Future Financing Sources:
(Average annual requirements over 5-year period beginning in fiscal 1989)

	Percentage of Use
1. State Funds	53%
2. Tax-Exempt Bonds	47%
3. Other Sources**	
4. Federal Funds**	
5. Internal Borrowing**	
6. Private Loans**	
7. Institutional Funds**	
8. Taxable Bonds**	

* Average based on <5 responses
** Average not calculated since 1 or 0 responses

Chapter Five

Technical Notes

This study was performed under certain limitations.

(1) We have responses only from those institutions that elected to respond.

- A random sample of 661 institutions was drawn from a universe of 2,803 research, doctoral, comprehensive, liberal arts, two-year, and medical colleges and universities by the Carnegie Foundation for the Advancement of Teaching. Two hundred nine institutions responded to the survey. The response rate by strata was as follows: research – 41%, doctoral – 37%, comprehensive – 12%, liberal arts – 2%, two-year – 2%, medical – 13%.

- Among the 209 survey responses, the level of item nonresponse varied considerably. Nonresponsive was high for urgent need questions and much lower for questions regarding physical plant descriptions and financial expenditures.

- Missing values were not inputed. We calculated averages based on available responses from the institutions able to answer each given question.

(2) The survey required respondents to quantify information which was highly subjective. We relied on respondents to provide the most meaningful estimates possible.

- The level of urgent need – repairs and renovations which jeopardize facilities if not performed – is subjective by definition. The point at which post-

poned maintenance jeopardizes facilities is very much open to interpretation as are the levels of needed expenditures.

- Some institutions conduct extensive and detailed facilities audits which may result in better estimates of urgent need. We averaged all urgent need responses regardless of the way the institutions calculated them.

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(3) Respondents were not always able to provide information in the requested format.

- Some institutions (often small private colleges) could not separate E&G and auxiliary financial information. We entered the combined numbers into our database because we could not develop a meaningful way to separate E&G from auxiliary financial information.

- Some institutions could not separate maintenance expenditures into categories: normal, renewal/replacement, and major maintenance. We entered the combined numbers into our database for lack of a meaningful way to separate the different kinds of maintenance expenditures.

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(4) This report relies primarily on averages, more precisely known as the arithmetic mean – the sum of a series divided by the number of figures in the series.

- The mean is strongly affected by an extremely large or small value. We have not examined the data for extreme observations.

- The arithmetic mean can be deceptive if the survey results are not normally distributed. We have not tested the distribution of our sample results.

- We used the arithmetic mean as a point estimator for the overall population of 2,803 research, doctoral, comprehensive, liberal arts, two-year, and medical institutions of higher learning. We did not calculate confidence intervals to test the reliability of our point estimators.

Chapter Six

Suggested Readings

A Bibliography of Capital Renewal/Deferred Maintenance Resources

The Association of Physical Plant Administrators of Universities and Colleges (APPA) and the National Association of Colleges and University Business Officers (NACUBO) have released *The Decaying American Campus*, their joint final report on the capital renewal and deferred maintenance needs in higher education in the United States. The survey, conducted in spring 1988 with the cooperation of Coopers & Lybrand, serves as the first comprehensive attempt since 1974 to determine the scope of the deferred maintenance problem.

But APPA and NACUBO have not just recently become interested in this massive crack in higher education's infrastructure. The following list is an unannotated bibliography of materials published by the associations since the late 1970s on the topic of capital renewal and deferred maintenance.

The materials are broken out under seven separate headings: articles and short reports from *APPA Newsletter*, APPA's monthly membership publication; longer, in-depth articles from *Facilities Manager*, APPA's quarterly professional magazine; papers presented at APPA's annual meetings and published in the *Proceedings*; books published by the Association; pending publications on the subject; articles in NACUBO *Business Officer*, and pertinent chapters in NACUBO's *Administrative Service*.

Many of the items listed here are out of print or not readily available. Some articles may be made available in reprint form, depending upon interest. To receive a current brochure of available books, contact APPA Publications, 1446 Duke Street, Alexandria, VA 22314-3492; and NACUBO Publications, One Dupont Circle, Suite 500, Washington, D.C. 20036.

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Chapter Seven

Glossary of Terms

Definitions of Facility Categories

Athletic Facilities

Gymnasiums, stadiums, arenas, practice areas.

Classroom Facilities

Classrooms and classroom services.

Health-Care Facilities

Hospitals, student infirmaries, and student health centers.

Laboratory Facilities

Classroom laboratories, general laboratories, and research laboratories.

Library/Study Facilities

Libraries, reading/study rooms, library stacks, open-stack reading rooms.

Office Facilities

Academic and administrative offices and associated space.

Other Facilities

Data processing, maintenance shops, storage, vehicle storage, central stores, utility plants, student union, audio visual, theatres, movies, conference centers, greenhouse, animal quarters, museums, galleries, concert halls, etc. as described by respondent.

Residential Facilities

Student and faculty housing/dormitories/apartments.

Unassigned Common Areas

Hallways, foyers, stairs, restrooms, etc.

Definitions of Funding Sources

Federal Funds

Resources provided through federal appropriations, grants, and loans.

Institutional Funds

Resources provided by the institution including funds from internal transfers, current fund accounts, restricted fund accounts, other private gifts, grants, and donations.

Institutional Tax-Exempt Bonds

Long- or short-term tax-exempt bonds issued by higher education institutions including tax-exempt commercial paper, pooled revenue bonds, variable rate demand bonds, etc.

Institutional Taxable Bonds

Long- or short-term taxable revenue bonds issued by higher education institutions including taxable commerce paper, private placement bonds, U.S. domestic public bonds, etc.

Internal Borrowing

Resources temporarily borrowed from undesignated, unencumbered institutional funds to be paid back at a future date. This includes temporary transfers but excludes resources from restricted funds.

Private Loans

Loans provided by private banks, investors, joint ventures, and all other private lenders. This excludes loans provided through institutional resources, federal, state, and local government resources, tax-exempt and taxable bonds, etc.

State Funds

Resources provided through state (or municipal) appropriations, grants, and loans.

Definitions of Maintenance Terms

Accumulated Deferred Maintenance

Maintenance projects from prior years and the current year that were not included in the maintenance process because of perceived lower priority status than those funded within available funding. Deferred maintenance includes postponed renewal and replacement maintenance and unperformed unscheduled major maintenance.

Capital Additions and Improvements including the following:

Alteration and Renovation is work that is required because of a change in use of the facility or a change in program.

New Construction includes internal and external planning for new construction and small construction if funded out of current funds.

Normal Maintenance is a systematic day-to-day process funded by the annual operating budget to control deterioration of the college or university plant facilities; e.g., structure, systems, equipment, pavement, and groups. Planned maintenance includes the following:

A. Scheduled repetitive work such as housekeeping activities, groundskeeping site maintenance, and certain types of service contracts.

B. Periodic scheduled work (preventive maintenance) that has been planned to provide adjustments, cleaning, minor repair, and routine inspections of equipment to reduce service interruptions.

C. Call-in requests for service.

Renewal and Replacement Maintenance

A systematic management process to plan and budget for known future cyclic repair and replacement requirements which extend the life and retain usable condition of campus facilities and systems and are not normally contained in the annual operating budget. This includes major activities that have a maintenance cycle in excess of one year, e.g., replace roofs, paint buildings, resurface roads, replace equipment (boilers, chillers, transformers), etc.

Unscheduled Major Maintenance

Work which requires immediate action to restore service or remove anticipated problems which will interrupt agency activities. Unscheduled major maintenance should be included if expenditures are made from current funds. Examples include loss of electric power, loss of water, loss of refrigeration, and building failures creating hazards to personnel or equipment.

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Institutional Typology

- *Research Universities:* These institutions offer a full range of baccalaureate programs, are committed to graduate education through the doctorate degree, and give high priority to research.

- *Doctorate-Granting Universities:* In addition to offering a full range of baccalaureate programs, the mission of these institutions includes a commitment to graduate education through the doctorate degree.

- *Comprehensive Universities and Colleges:* These institutions award more than half of their baccalaureate degrees in two or more occupational or professional disciplines, such as engineering or business administration, and may also offer graduate education through the masters degree.

- *Liberal Arts Colleges:* These institutions are primarily undergraduate colleges that award more than half of their baccalaureate degrees in arts and science fields.

- *Two-Year Community, Junior, and Technical Colleges:* These institutions offer certificate or degree programs through the Associate of Arts level and, with few exceptions, offer no baccalaureate degrees.

- *Medical Schools and Medical Centers:* These institutions award most of their professional degrees in medicine.

APPA

1446 Duke Street
Alexandria, VA 22314-3492

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